5-5 Use Inequalities in a Triangle

Definition of Inequality-- a > b iff there is a positive number c, such that a = b + c

8 = 5 + 3

8 > 5

8 > 3 } def. of ineq.

Properties

Transitive

Addition/Subtraction

Multiplication/Division

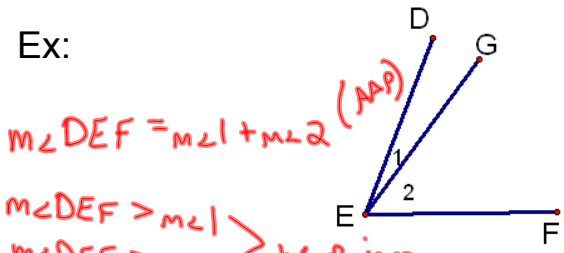
Substitution

Ex:

LN = LM + MN SAP

LN > LM
LN > MN > def of ineq

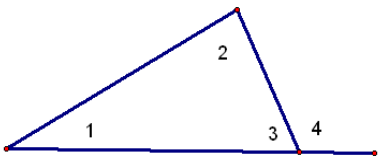
Ex:



m∠DEF = m∠1 + m∠2 (APP)

m∠DEF > m∠1
m∠DEF > m∠2 > def of ineq.

Ex:



m∠4 = m∠1 + m∠2 (Ext ∠ thm)

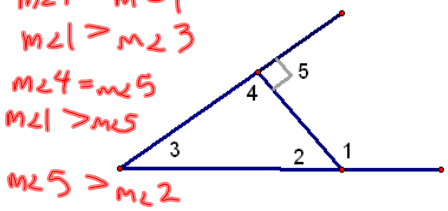
m∠4 > m∠1
m∠4 > m∠2

Exterior Angle Inequality Theorem--The exterior angle of a triangle is greater than either of its corresponding remote interior angles

m∠4 > m∠1
m∠4 > m∠2

Which angle is the largest?

(Figure is not drawn to scale.)



$m\angle 1 > m\angle 4$

$m\angle 1 > m\angle 3$

$m\angle 4 = m\angle 5$

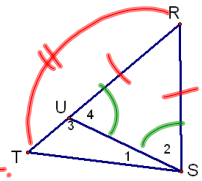
$m\angle 1 > m\angle 5$

$m\angle 5 > m\angle 2$

$\angle 1$

Given: $\triangle RST$
$RU = RS$
$RT > RS$

Prove: $m\angle RST > m\angle T$

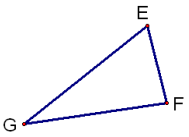


S.	R.
①	① Given
② $m\angle RST = m\angle 1 + m\angle 2$	② AAP
③ $m\angle RST > m\angle 2$	③ def. of ineq.
④ $\angle 2 \cong \angle 4$	④ BAT
⑤ $m\angle 2 = m\angle 4$	⑤ def of $\cong$
⑥ $m\angle RST > m\angle 4$	⑥ Subst.
⑦ $m\angle 4 > m\angle T$	⑦ Ext $\angle$ Ineq thm
⑧ $m\angle RST > m\angle T$	⑧ Transitive

Theorem 5.10--If one side of a triangle is longer than another side, then the angle opposite the longer side is larger than the angle opposite the shorter side.

Given: $GE > EF$

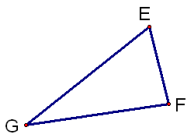
Concl: $m\angle F > m\angle G$



Theorem 5.11--If one angle of a triangle is larger than another angle, then the side opposite the larger angle is longer than the side opposite the smaller angle.

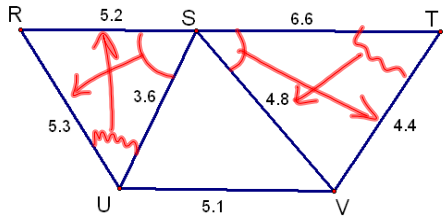
G: $m\angle F > m\angle G$

Concl: $GE > EF$



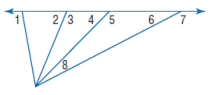
1. Which is greater, $m\angle RSU$ or $m\angle SUR$?

2. Which is greater, $m\angle TSV$ or $m\angle STV$?



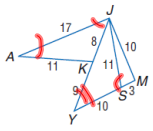
Determine which angle has the greatest measure.

17. $\angle 1, \angle 2, \angle 4$
18. $\angle 2, \angle 4, \angle 6$
19. $\angle 3, \angle 5, \angle 7$
20. $\angle 1, \angle 2, \angle 6$
21. $\angle 5, \angle 7, \angle 8$
22. $\angle 2, \angle 6, \angle 8$

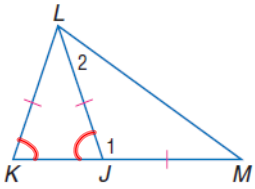


Determine the relationship between the measures of the given angles.

29. $\angle KAJ, \angle AJK$
30. $\angle MJY, \angle JYM$
31. $\angle SMJ, \angle MJS$
32. $\angle AKJ, \angle JAK$
33. $\angle MYJ, \angle JMY$
34. $\angle JSY, \angle JYS$



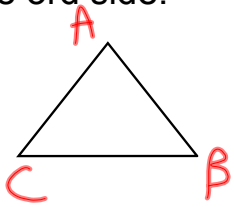
35. Given: $\overline{JM} \cong \overline{JL}$
$\overline{JL} \cong \overline{KL}$
Prove: $m\angle 1 > m\angle 2$



Pasta Challenge

Thm. 5.12--<u>The triangle inequality theorem</u>--the sum of the lengths of any 2 sides of a triangle is greater than the length of the 3rd side.

$AB + BC > CA$
$AC + BC > AB$
$AC + AB > BC$



Do the lengths represent a triangle?

4, 5, 7 yes
9 > 7

13, 12, 20 yes
25

7, 14, 21 no
21 = 21

7, 7, 7 yes
14 > 7

8, 8, 19 no
16 < 19

Two sides of a triangle are 6 and 11. What is the range of the 3rd side?

$5 < x < 17$

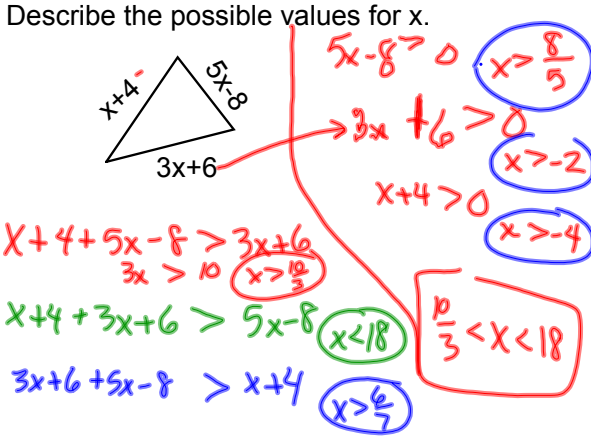
-11 -6 5

$+6$ $+11$ 17

Two sides of a triangle are 12 and 18.
What is the range of the 3rd side?

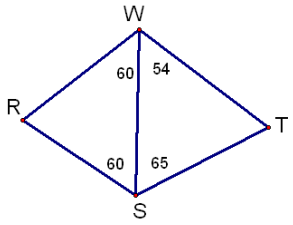
$6 < x < 30$

Describe the possible values for x.



HW p331-332
#s 6, 10-13, 16-19, 21-23, 30, 31, 33, 34

What is the longest segment?



What is the longest segment?